InCom Working Group

127 Fish Passes

Mark Cornish
U.S. Army Corps of Engineers
Rock Island District

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Final Product

Bottom Line Up-Front

Document existing practices for the current state-of-the-science for fish passages that will aid designers when building and modifying existing locks and dams

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Matters to be Investigated

1. Structural and non-structural fish passage methodologies
2. Effective bioresponse monitoring techniques for quantifying success
3. Biological and hydraulic computer simulations techniques
4. Requirements of migratory fish species on connectivity, habitat availability
5. Computer simulation techniques for predicting logitudinal connectivity (systemic changes)
6. Compare cost and economic benefit taking into account size of river and height of dam

InCom Working Group 127 – Members

USA				
Mark Cornish	US Army Corps of Engineers, Rock Island District		John Plump	INCA, Inc, Portland, Oregon
Aaron Buesing	US Army Corps of Engineers, St. Paul District			

Netherlands				
K. Dorst	RWS		G. Kruitwagen	Witteveen & Bros., Niewstraat
Martin Kroes	VisAdvies, Vondellaan			

Canada	
Lonnie King	Fisheries & Oceans Canada, Ottawa

EnviCom Representative	
Dr. Craig Fishenich	US Army Corps of Engineers, ERDC, Vicksburg

1. Structural and non-structural fish passage meth

Non-Structural

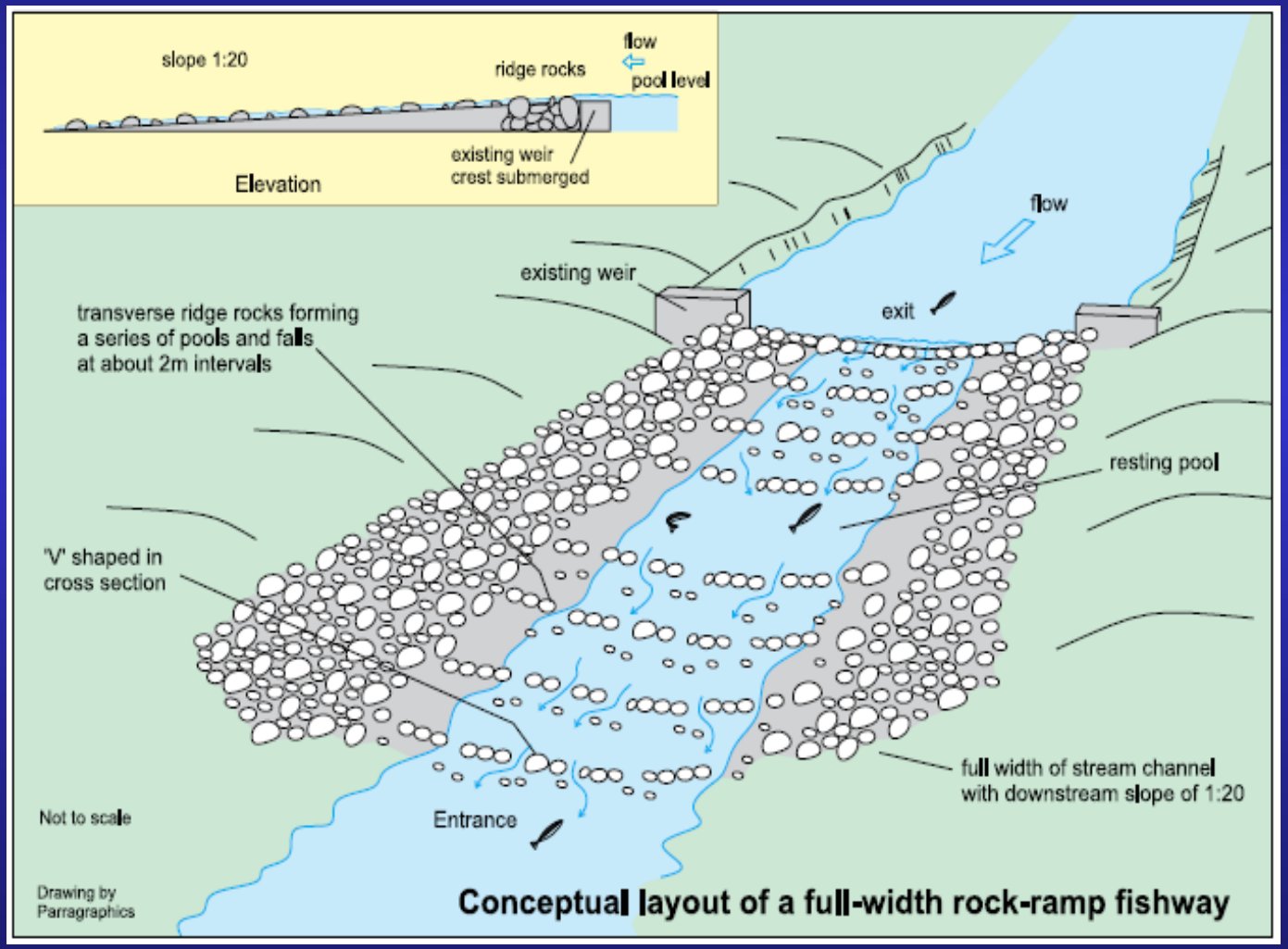
- No project
- Increase open river conditions
- Fish lockage
- Fish stocking

Structural

- Rock ramps
- Nature like by pass channels
- Technical fishway
- Dam removal

Structural Techniques

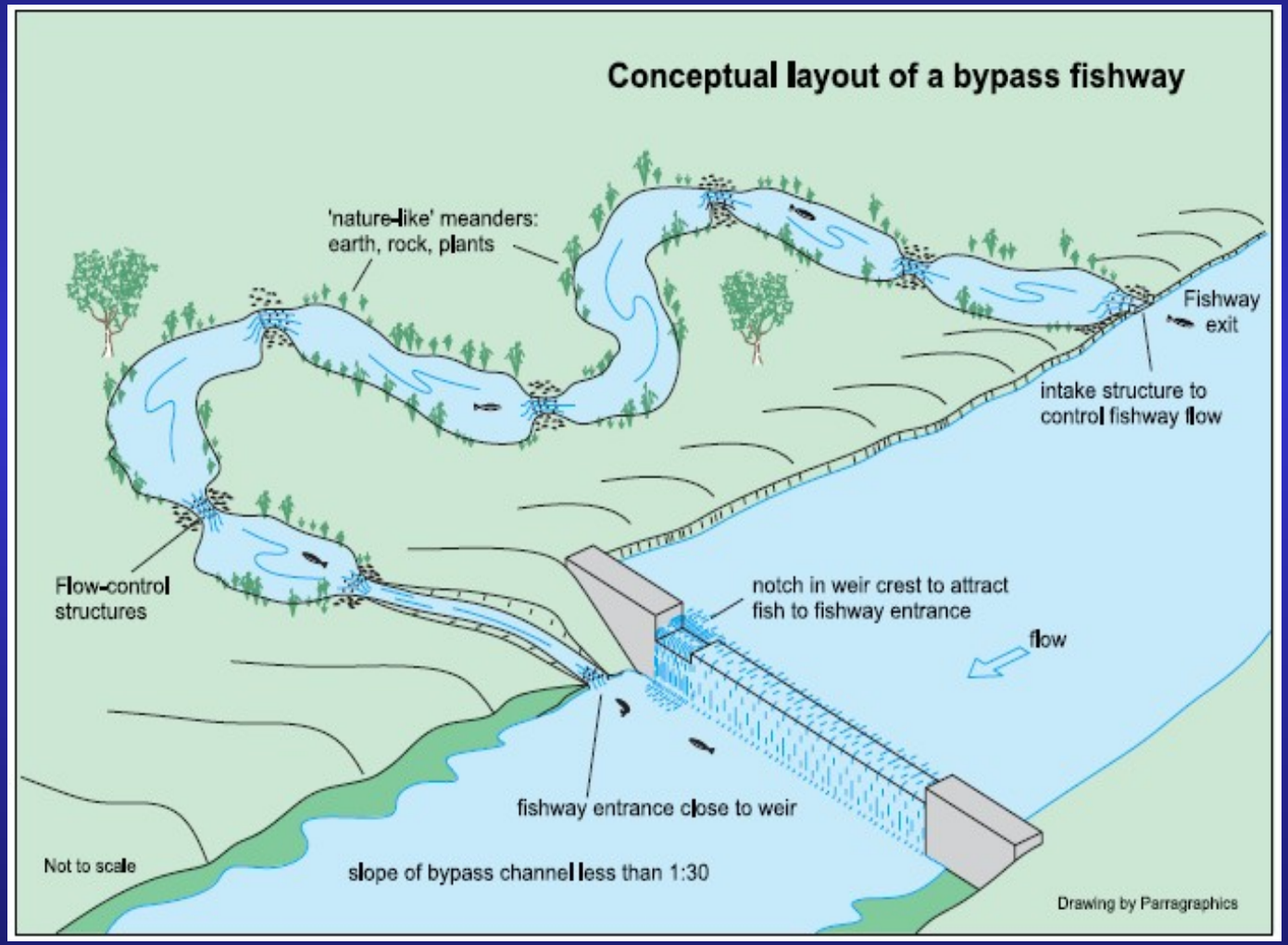
Rock Ramp



Murray River, Australia

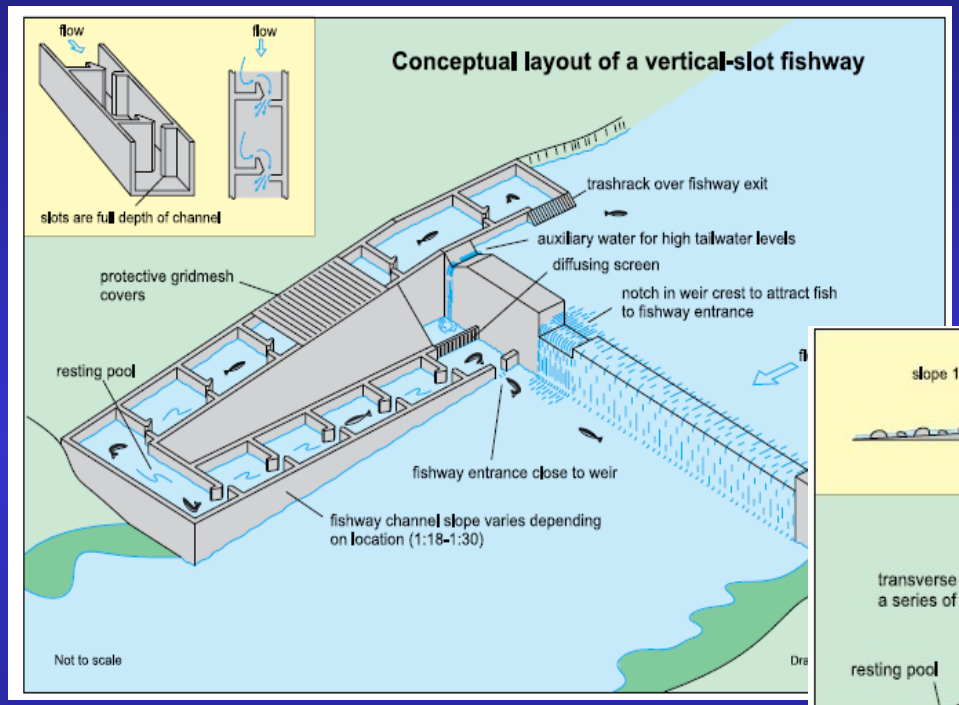
Structural Techniques

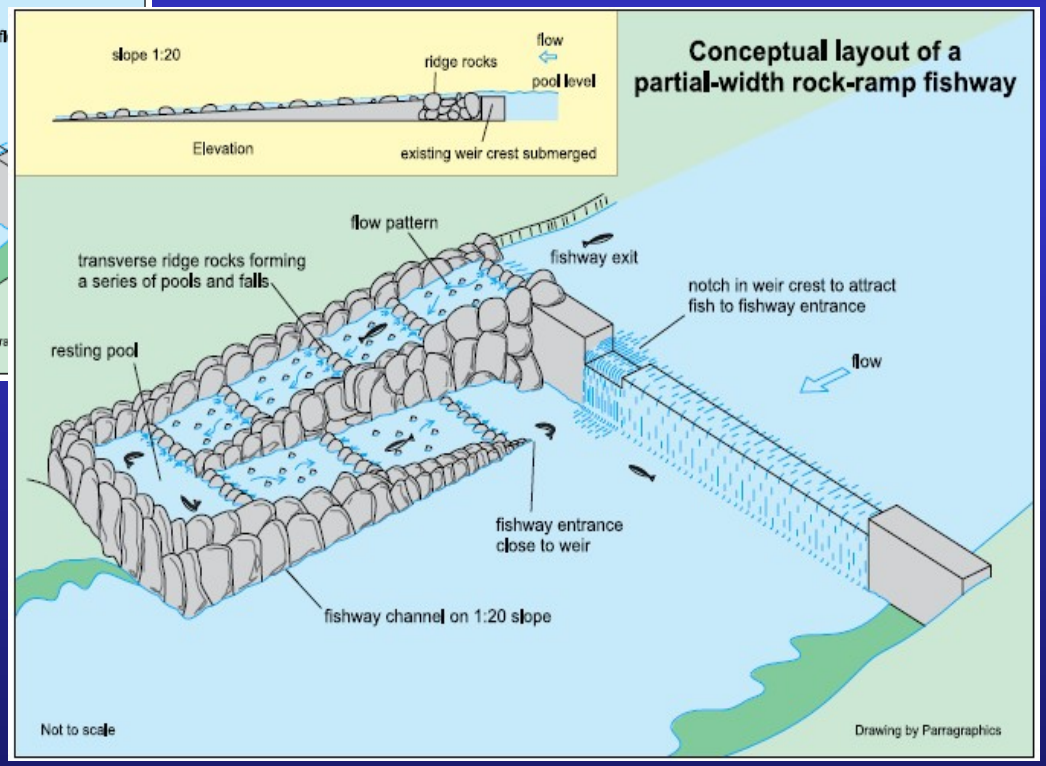
Bypass Channel


Conceptual layout of a bypass fishway
'nature-like' meanders: earth, rock, plants
Fishway exit
intake structure to control fishway flow
Flow-control structures
notch in weir crest to attract fish to fishway entrance
flow
fishway entrance close to weir
Not to scale
slope of bypass channel less than 1:30
Drawing by Parragraphics

Structural Techniques

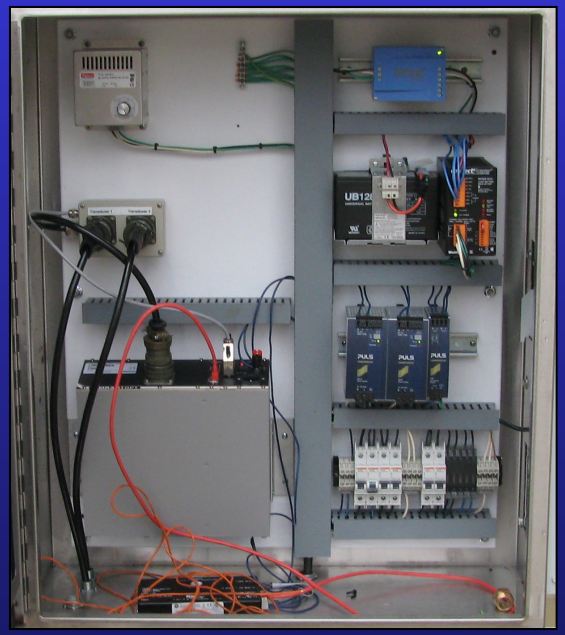
Technical Fishways & Hybrids

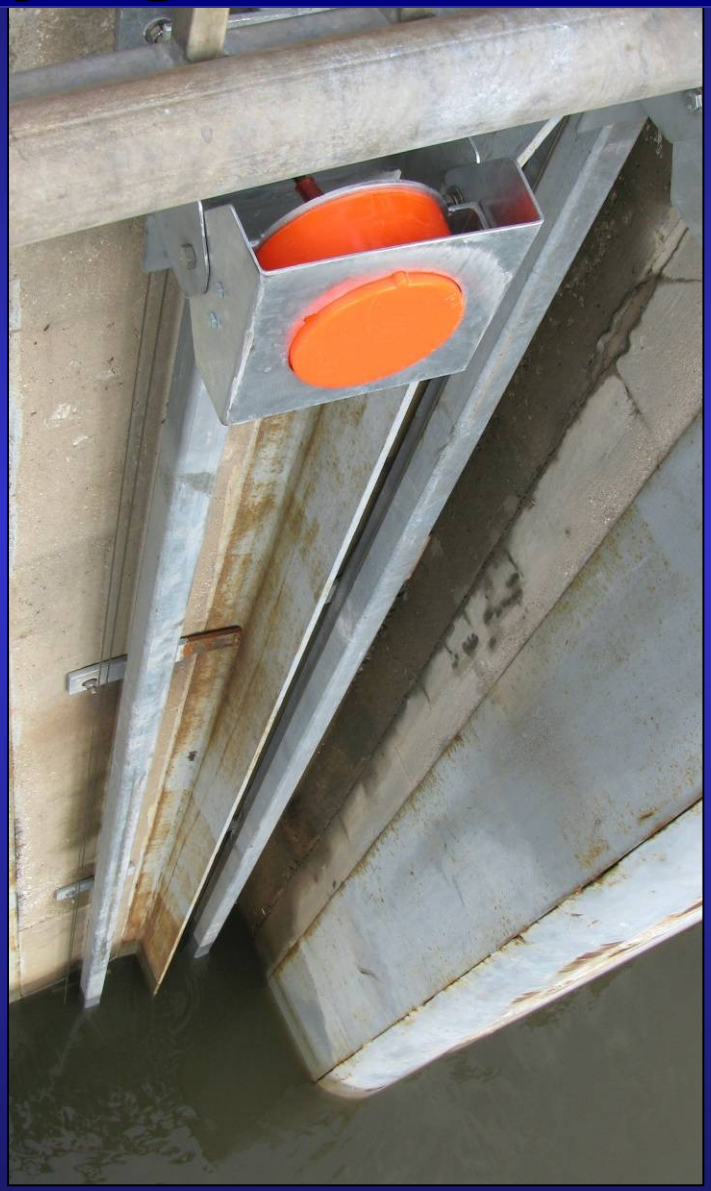

flow
flow
slots are full depth of channel
Conceptual layout of a vertical-slot fishway
trashrack over fishway exit
auxiliary water for high tailwater levels
diffusing screen
protective gridmesh covers
notch in weir crest to attract fish to fishway entrance
resting pool
fishway entrance close to weir
fishway channel slope varies depending on location (1:18-1:30)
Not to scale



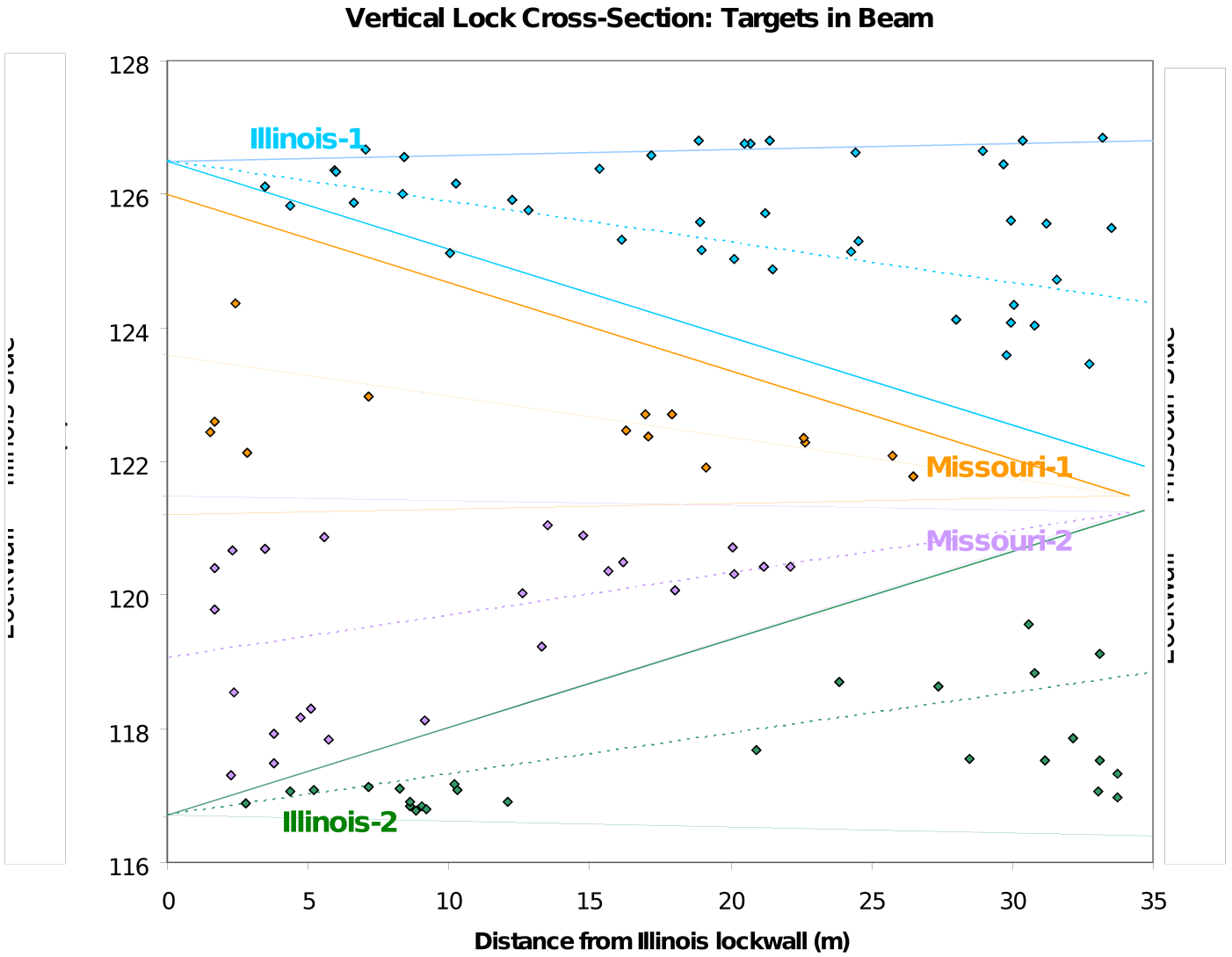
2. Effective bioresponse monitoring techniques for quantifying success

Stationary Hydroacoustics





Stationary Hydroacoustics



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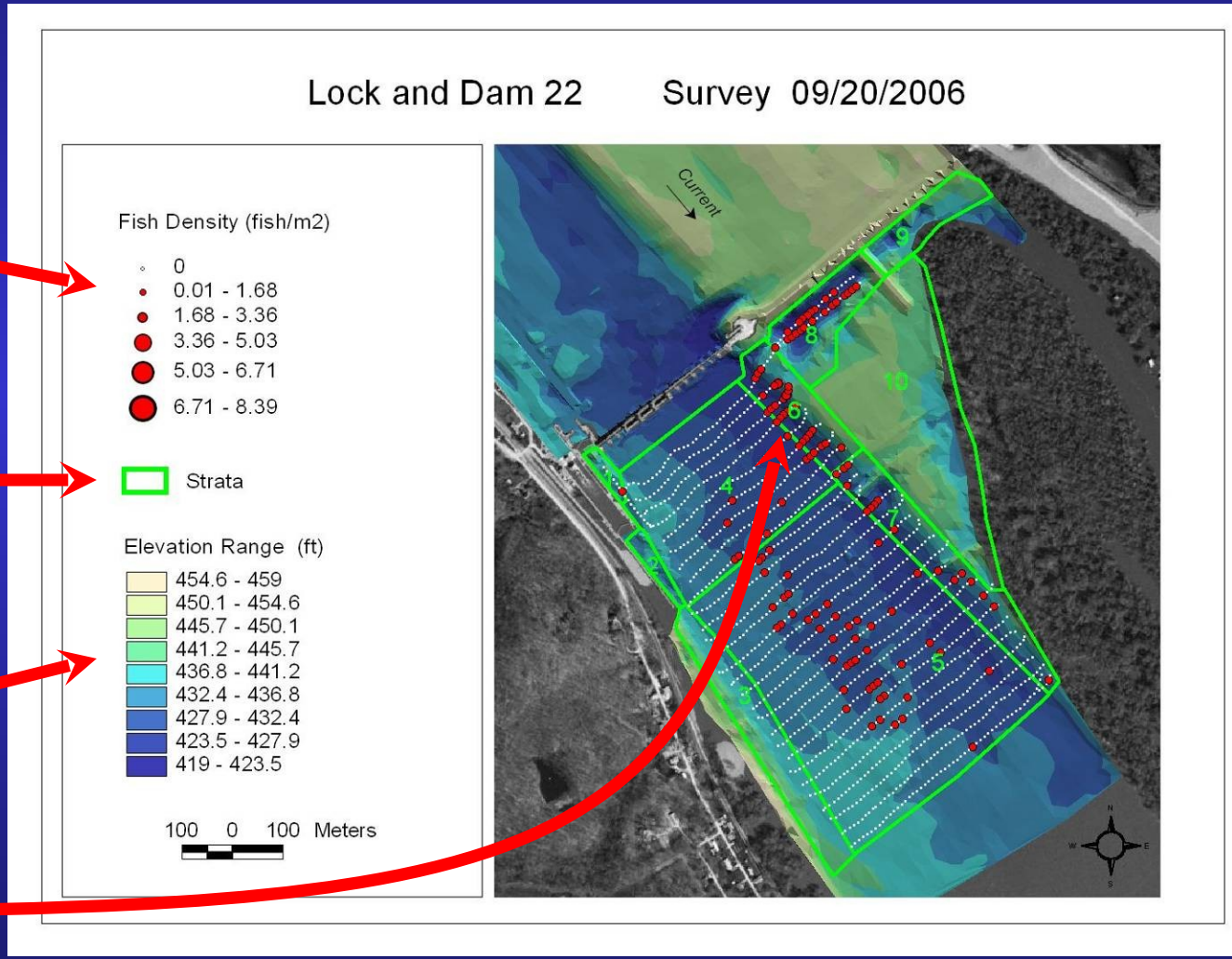
Mobile Hydroacoustics
Transect Information

Fish Density (fish/m²)

Population Estimate

Bathymetry/ Habitat Utilization

Fish Aggregations



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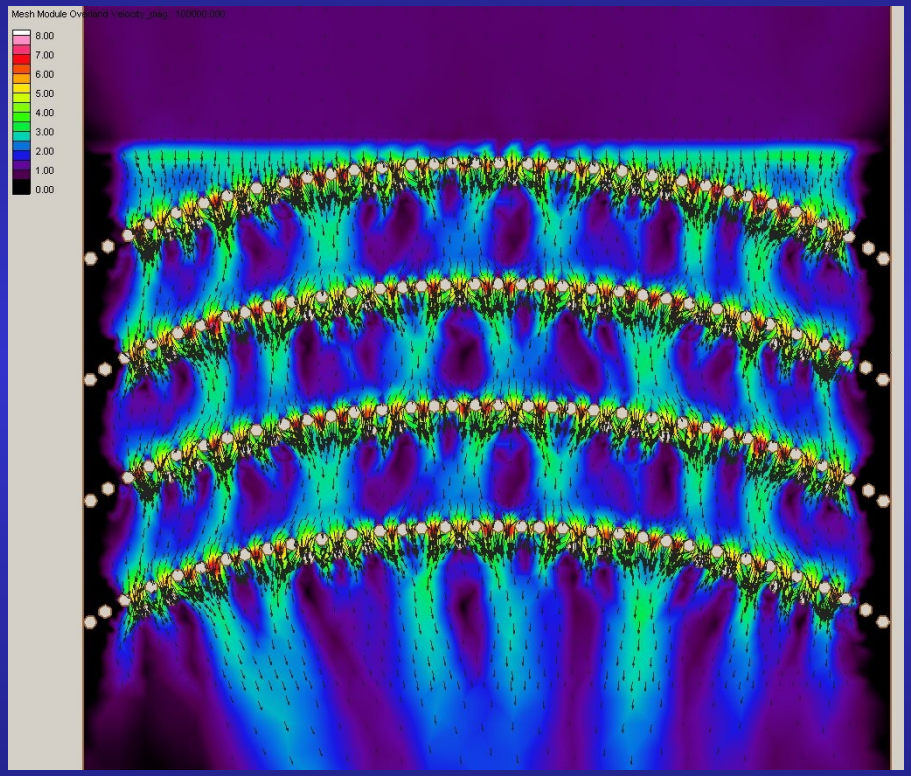
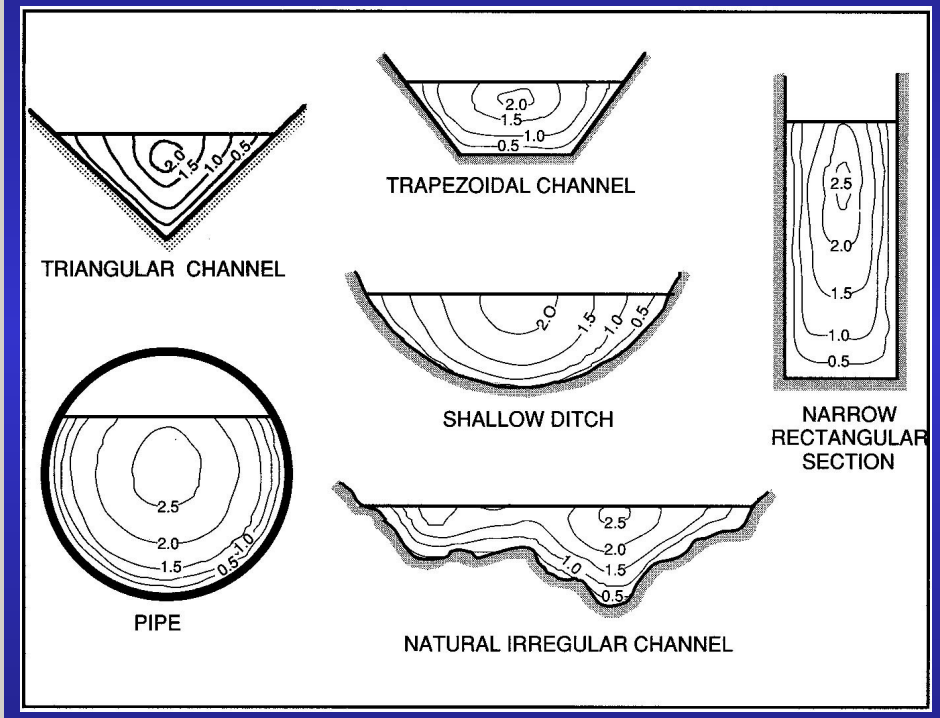
3. Biological and hydraulic computer simulations techniques





Adaptive Hydraulics Model

3. Biological and hydraulic computer simulations techniques

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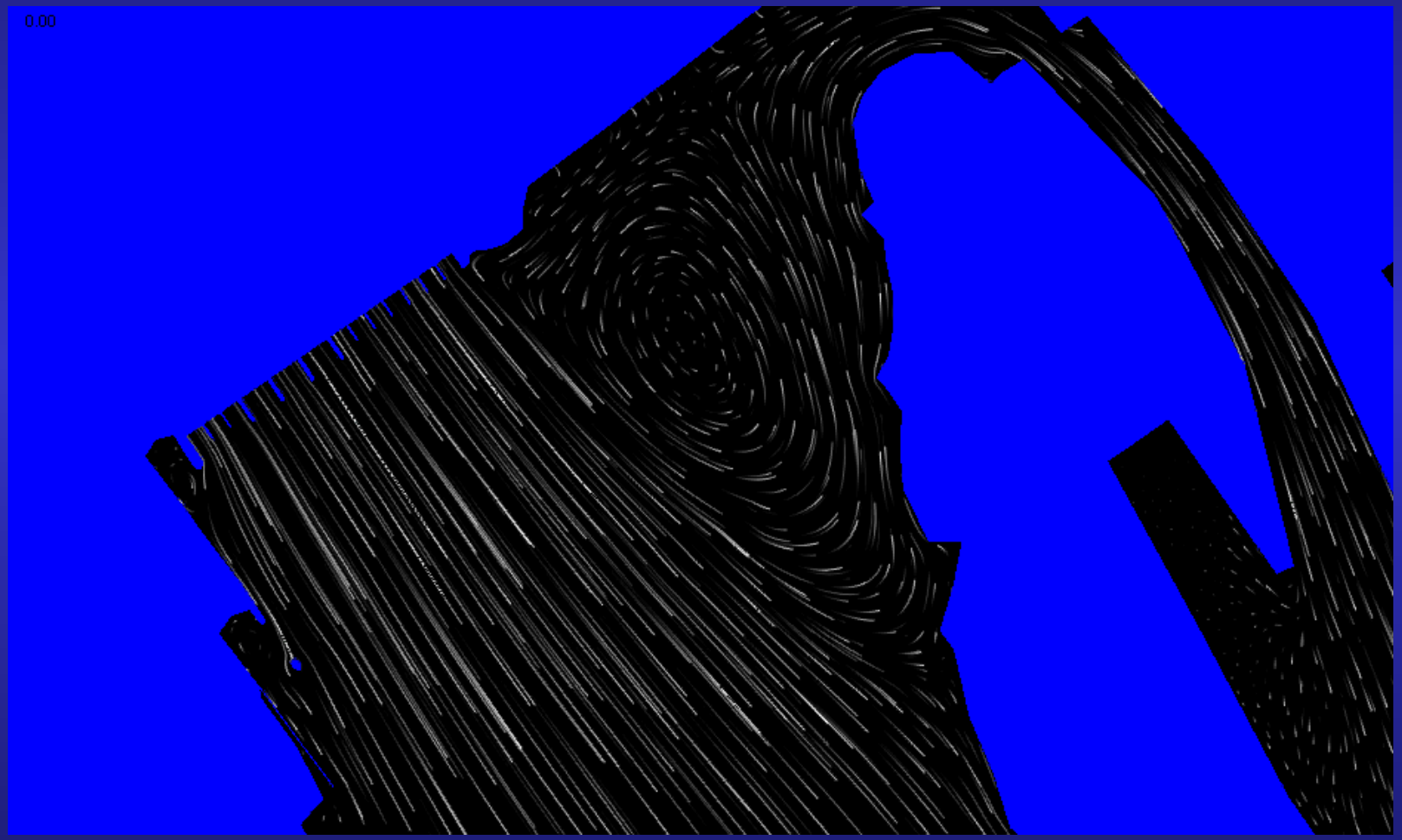
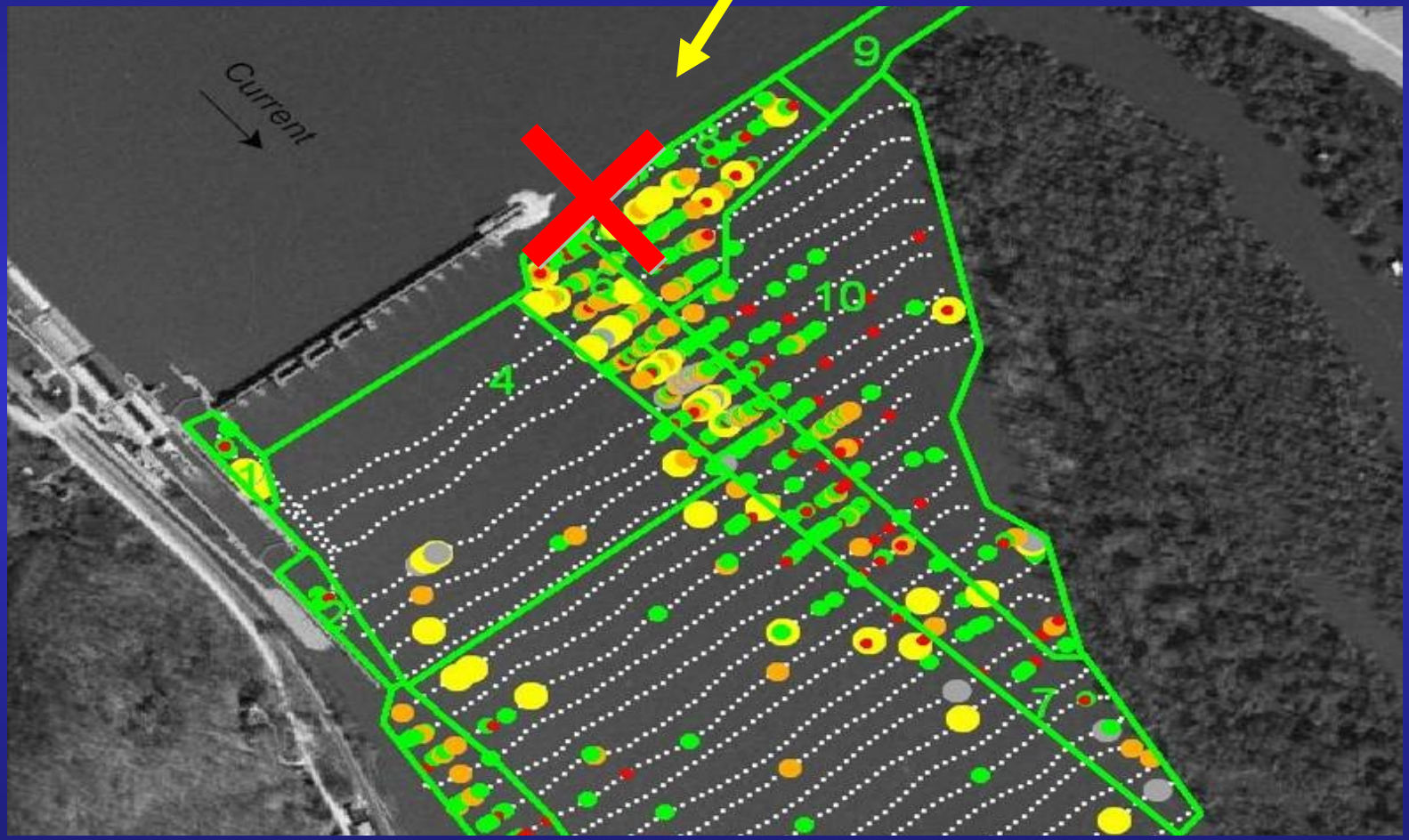


Put fishway here

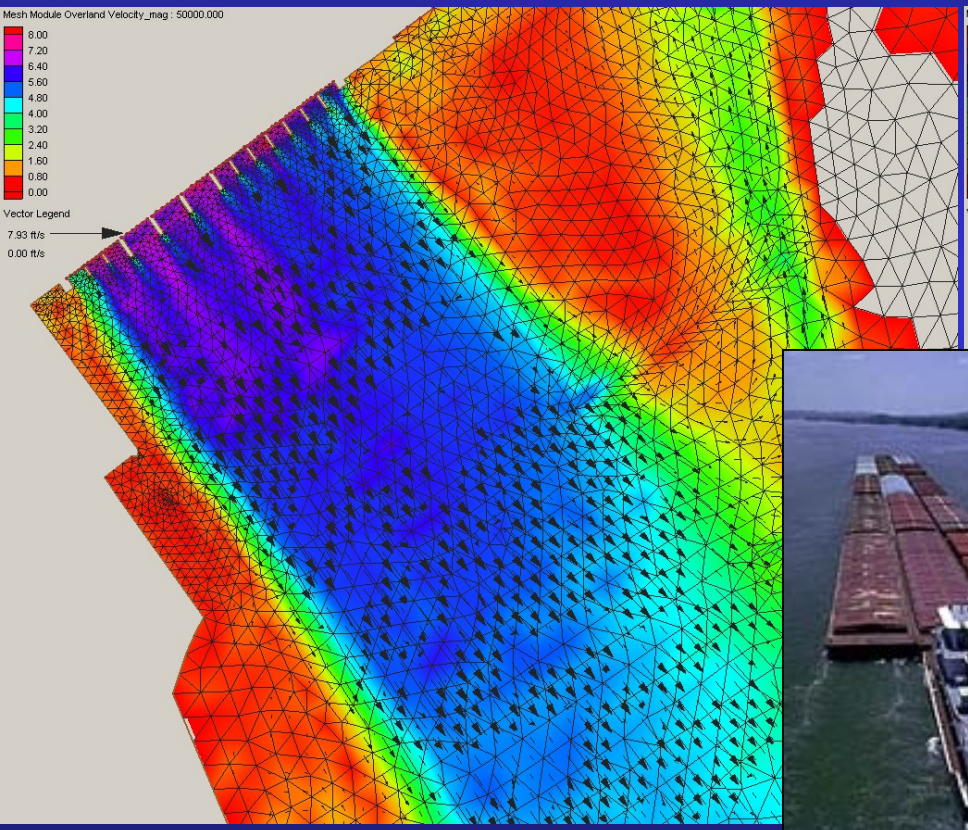


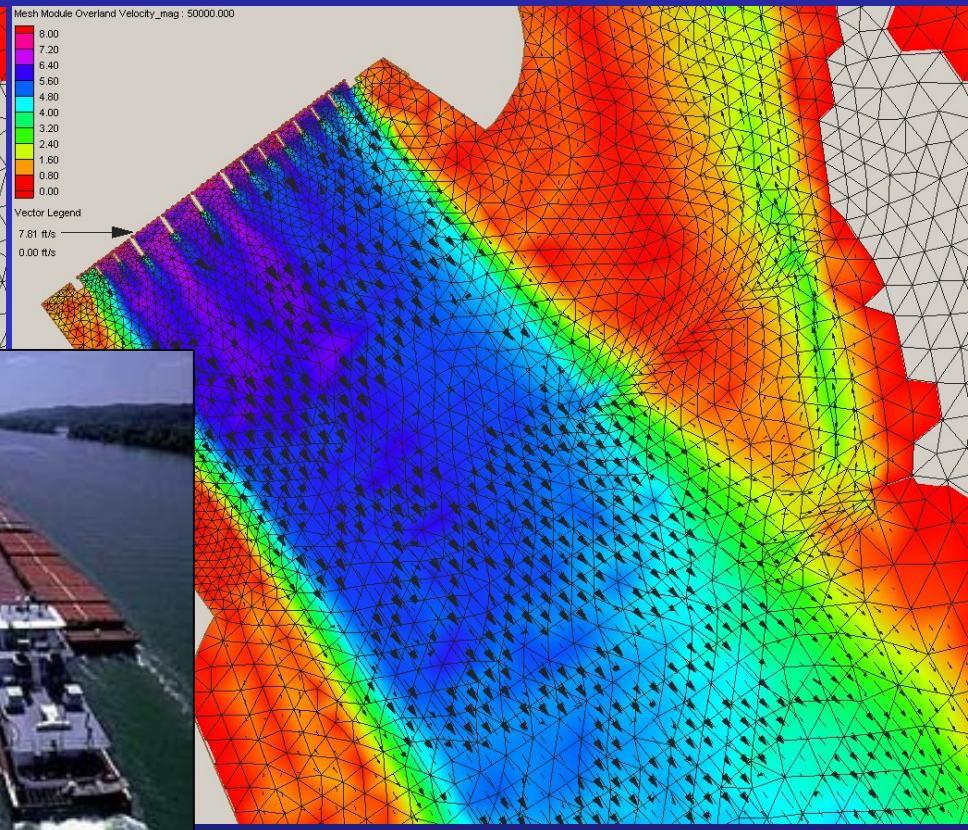
Minimize detrimental effects on navigation

Tailwater Model: Velocity Comparison

Existing Condition

With Fishway

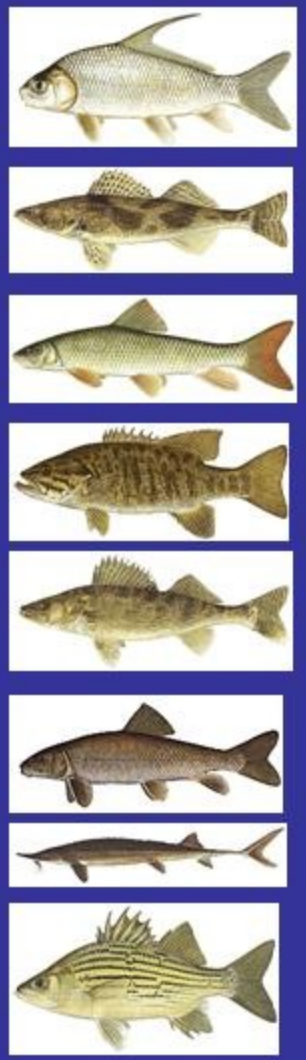




4. Requirements of migratory fish species on connectivity, habitat availability

American eel
spotted sucker
silver lamprey
shorthead redhorse
lake sturgeon
black redhorse
pallid sturgeon[A]
golden redhorse
longnose gar
silver redhorse
shovelnose sturgeon
northern hog sucker
goldeye
white sucker
mooneye
channel catfish
paddlefish[B]
blue catfish

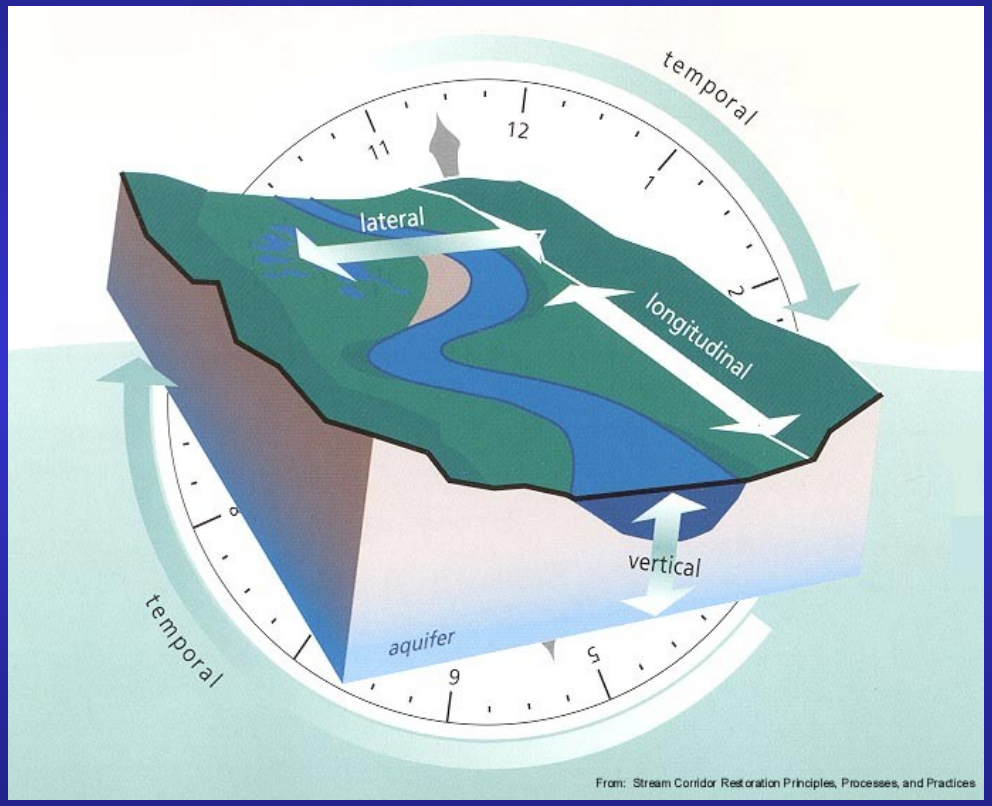
Alabama shad
flathead catfish
skipjack herring
white bass
gizzard shad
yellow bass
threadfin shad
northern pike
blue sucker[B]
smallmouth bass
smallmouth buffalo
largemouth bass
bigmouth buffalo
sauger
quillback
walleye
highfin carpsucker
freshwater drum



[A] federally listed endangered species

[B] candidate for federal listing

5. Computer simulation techniques for predicting logitudinal connectivity (systemic changes)



Leslie Matrix Modeling

- water quality
- recruitment
- swimming ability
- habitat availablity
- etc.

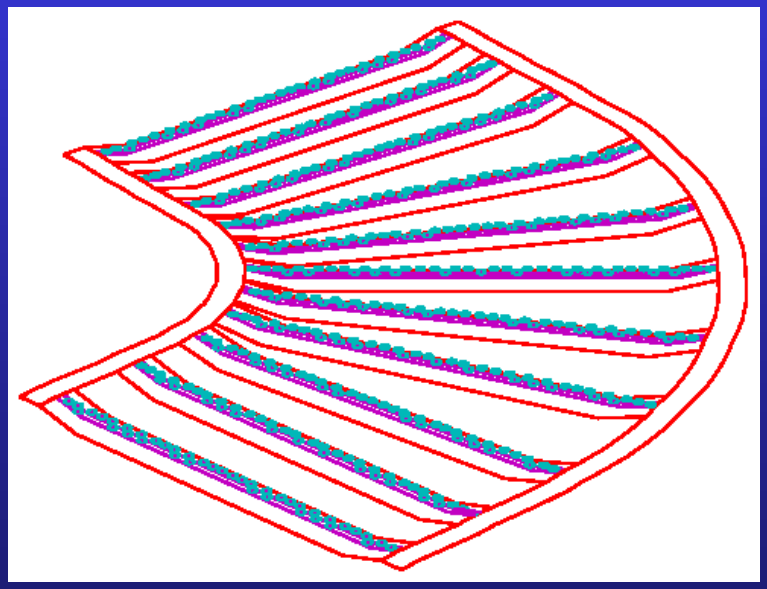
Population Modeling

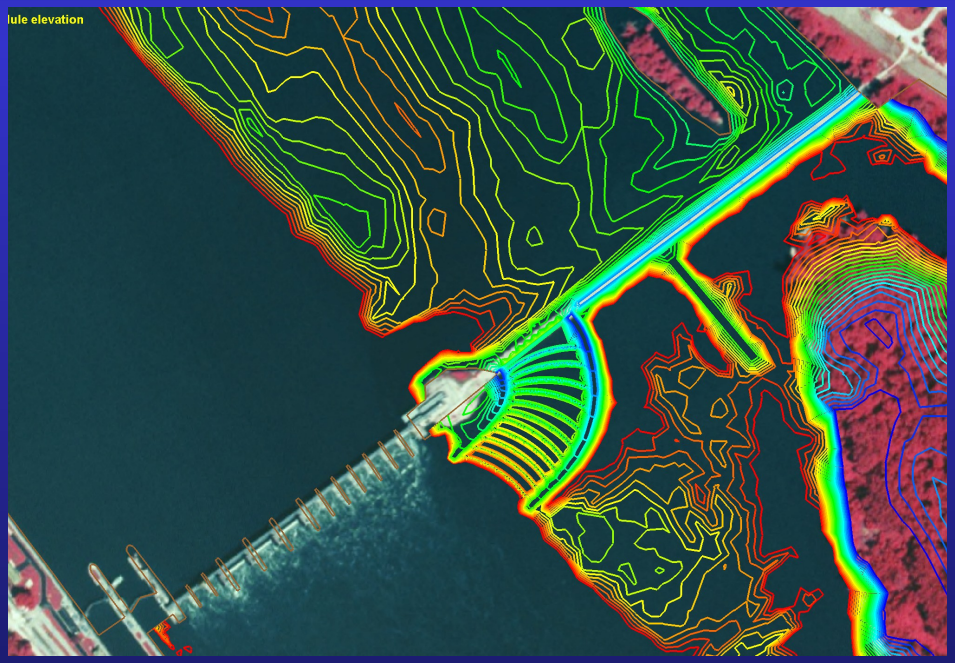
6. Compare cost and economic benefit taking into account size of river and height of dam

Alternative	Construction Cost	Operation & Maintenance	Biological Effectiveness	Cultural Stewardship
No Project	None	Moderate/High	Low	High
Dam Removal	Moderate	None	High	Low/Moderate
Rock Ramp	Moderate	Moderate	High	Moderate
Bypass Channel	Low/Moderate	Moderate	High/Moderate	High
Technical Fishway	Low	Moderate/High	Moderate/Low	High
Fish Elevator	High	High	Low	High
Fish Locking	High	High	Moderate	High
Fish Stocking	None	High	Moderate	High

Compare cost and economic benefit taking into account size of river and height of dam

How much flow will be needed?
How wide should it be?
Will a fishway affect navigation?
How can the design be optimize for fish?
What size does the stone need to be?





Next Steps

- Establish Working Group
- Hold initial meeting
- Begin process for Draft PIANC Report nº 127

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Document existing practices for the current state-of-the-science for fish passages that will aid designers when building and modifying existing locks and dams